Eat for Function

Program design for any kind of athletic/fitness goal is specific to the needs of the individual client. Program design is subject to change based on the client's response and ability to adapt, and environmental factors that may or may not be controlled. Life happens. There is no good cookie-cutter method, because in the end, everyone is built differently to work differently. The dynamic and organic nature of physical performance/development is well accepted. So why is diet and nutrition any different? The same way it makes sense to periodize program design/training, it makes sense that one's nutritional needs are subject to at least the same dynamism and "periodization" as opposed to rigid macronutrient ratios, X%Y%Z% (Acheson, 2010; Burke, Hawley, Wong, & Jeukendrup, 2011; Noakes & Phinney, 2014). Eat the way you need to function and perform; eat in a way that the nutrients support you--functional eating, supported by scientific knowledge (not eat what you want, whenever you want).

Burke et al. (2011) summarized several well supported principles relating to carbohydrate needs. High intensity training requires a respective level of carbohydrate intake to match the activity and restore glycogen (Burke et al., 2011). Burke et al. (2011) described "carbohydrate availability" to describe a person's carbohydrate needs respective of their energy needs or "costs". With regards to manipulating carbohydrate availability for a body's energy demands, it may be more accurate to say that there is a "high or low availability" of carbohydrates as opposed to a high/low carbohydrate diet (Burke et al., 2011). Burke et al. (2011) noted, as an example, that during competition or a high performance situation, high carbohydrate availability is well advised. At other times (e.g. off-season), the same athlete may only need moderate or lower carbohydrate availability (Burke et al., 2011, Noakes & Phinney, 2014).

Noakes and Phinney (2014) noted that indigenous people of the Artic have survived on extremely low carbohydrate availability in their diet (virtually carbohydrate-free). Noakes and Phinney (2014) also noted cases where athletic performance under high intensity was not inhibited by a diet with low carbohydrate availability. Some elite athletes had so well chronically adapted to a diet with less than 10% energy from carbohydrates, that they were still able to oxidize fat to fulfill their energy needs (Noakes & Phinney, 2014). Volek, Fernandez, Feinman, and Phinney (2008) noted that restricting carbohydrate availability led to global hormonal and metabolic changes in response.

Contrary to popular recommendations, research exists to suggest that lower available carbohydrate diets, low carbohydrate ketogenic diets, and ketogenic diets may be warranted and beneficial. Ketogenic diets are marked by higher fat availability, moderate protein availability, and low carbohydrate availability (Paoli, 2014). Low carbohydrate ketogenic diets mean that carbohydrates are extremely reduced to less than 20 grams per day (Paoli, 2014; Yancy, Olsen, Guyton, Bakst, & Westman, 2004).

Ketogenic diets induce "physiological ketosis" (a metabolic state) which is different from diabetic ketosis (pathological) (Paoli, 2014). During physiological ketosis from extremely low carbohydrate intake, the glucose reserves are insufficient for producing oxaloacetate for fat oxidation in the Krebs cycle and for supplying glucose to the central nervous system (CNS) (Paoli, 2014). The overproduction of acetyl-CoA leads to the production (ketogenesis, primarily

in liver mitochondrial) of ketones acetoacetate (AcAc), B-hydroxybutyric acid (BHB), and acetone (Paoli, 2014). When there is too much AcAc, it gets converted into two other ketone bodies and eliminated as urine (Paoli, 2014). The acetone is primarily eliminated in the lungs via respiration and gives "fruity/sweet breath" (Paoli, 2014). BHB is converted back into AcAc which is further converted into acetoacetyl-CoA which further give two molecules of acetyl-CoA to be used in the Krebs cycle (Paoli, 2014).

Low carbohydrate ketogenic diets have been used for some conditions such as hyperlipidemia and children's epilepsy (Paoli, 2014). Ketogenic diets have also demonstrated some benefits such as weight reduction in obesity, reducing total cholesterol, increasing high density lipoproteins (HDL) and decreasing triglycerides, increasing size and volume of LDL-C particles which is better than smaller particles that tend to have higher propensity to deposit on arterial walls (Hu & Bazzano, 2013; Paoli, 2014). Low carbohydrate diets (as compared to isocaloric diets which are moderate carbohydrate, moderate fat, and moderate protein) also tended to decrease central obesity (decrease abdominal area fat mass) by 30% and lower systolic and diastolic blood pressure (Hu & Bazzano, 2013; Volek et al., 2004).

Yancy et al. (2004) studied hyperlipidemic persons aged 18-65 yrs old, who were randomly assigned to a low-carbohydrate diet ketogenic diet, or a low-fat-low-cholesterol reduced calorie diet for 24 weeks. No formal exercise programs were suggested, and the participants meet regularly for support, education/instruction, questionnaires and monitoring (Yancy et al., 2004). Yancy et al. (2004) found that the low carbohydrate diet led to greater weight (fat) loss and higher HDL as compared to the low-fat diet. The low carbohydrate ketogenic diet also seemed to improve risk factors of metabolic syndrome which include body weight, blood pressure, and serum lipid levels (Yancy et al., 2004).

Hussain et al. (2012) studied 363 overweight and obese participants (some of whom had type 2 diabetes) for a 24 week diet intervention (low carbohydrate ketogenic diet or low calorie diet). Hussain et al. (2012) also found improvements in the metabolic syndrome risk factors.

Among lay-people, there are many "gym/diet myths" including over consumption of sugary sports drinks. In a general sense, the average Joe/Jane participating in a low-moderate intensity workout probably does not need every drink to be a sports drink (probably water or a diluted sports drink would be better). High carbohydrate feeding (and high protein feeding) has been "oversold". With the help of health and fitness professionals, moderation, common sense, and science would be beneficial in planning individualized nutrition that evolves with a person's ever-changing activities and functions.

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